The Braden Scale for Predicting Pressure Sore Risk

NANCY BERGSTROM • BARBARA J. BRADEN • ANTOINETTE LAGUZZA • VICTORIA HOLMAN

The Braden Scale for Predicting Pressure Sore Risk was developed to foster early identification of patients at risk for forming pressure sores. The scale is composed of six subscales that reflect sensory perception, skin moisture, activity, mobility, friction and shear, and nutritional status. Content and construct validity were established by expert opinion and empirical testing. Three studies of reliability are reported here, using raters who varied in level of educational preparation and geographic region. Two prospective studies of predictive validity were completed to determine the scale's sensitivity and specificity. Reliability ranged from r = .83 to r = .94 for nurses' aides and licensed practical nurses; when used by registered nurses, the reliability increased to r = .99. Predictive validity was calculated for each cut-off point of the scale. Using a cut-off point of 16, sensitivity was 100% in both studies. Specificity ranged from 64% to 90%. This instrument has highly satisfactory reliability when used by RNs, and greater sensitivity and specificity than instruments previously reported.

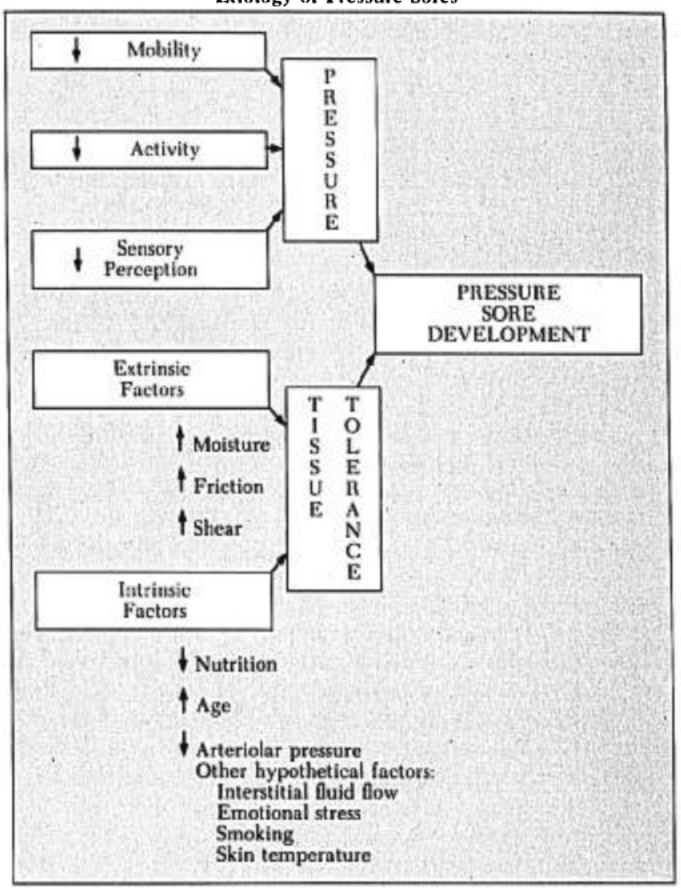
Prevention and treatment of pressure sores are significant nursing concerns. Nurses' ability to identify patients at risk for pressure sore formation would help to contain costs of treatment and unnecessary preventive care. Scales have been developed by Gosnell (1973) and Norton, McLaren, and Exton-Smith (1962) for predicting pressure sore risk. Although these scales have not been fully tested for reliability and validity, they have demonstrated a tendency to overpredict which patients will develop pressure sores and to misclassify as not at risk patients who have developed pressure sores (Goldstone & Goldstone, 1982; Goldstone & Roberts, 1980; Gosnell, 1973; Roberts & Goldstone, 1979). The purpose of this article is to describe the development of a scale for predicting pressure sore risk.

The Conceptual Schema

A conceptual schema organizing and examining the current knowledge base and identifying directions for further research related to the etiology of pressure sores has been reported (Braden & Bergstrom, 1987). In this conceptualization, the critical determinants of pressure sores are the intensity and duration of pressure and the tolerance of the skin and supporting structures for pressure (see Figure 1).

The intensity and duration of pressure are related to mobility, activity, and sensory perception. Mobility is the ability to change and maintain or sustain body positions.

Figure 1. The Conceptual Schema Depicting Factors in the Etiology of Pressure Sores



NOTE: From "A Conceptual Schema for the Study of the Etiology of Pressure Sores" by Barbara Braden and Nancy Bergstrom, 1987, *Rehabilitation Nursing, 12*(1), p. 9. Copyright 1987 by the Association of Rehabilitation Nurses. Reprinted with permission.

NANCY BERGSTROM, PHD, RN, is an associate professor and interim associate dean, School of Nursing, University of Nebraska Medical Center, Omaha, NE.

BARBARA J. BRADEN, MS, RN, is an associate professor, School of Nursing, Creighton University, Omaha, NE.

ANTOINETTE LAGUZZA, MS, RN, is an assistant professor, School of Nursing, Creighton University, Omaha, NE.

VICTORIA HOLMAN, MSN, RN, resides in Reno, NV. At the time of this study she was a graduate student at the University of Nebraska Medical Center, Omaha, NE.

Accepted for publication October 29, 1986.

This research was funded by the US Department of Health and Human Services, Division of Nursing, 1R01 NU0161, and Creighton University, Omaha, NE. The Teaching Nursing Home Program was sponsored by the Robert Wood Johnson Foundation.

The studies reported here were presented at the Council of Nurse Researchers, San Diego, CA, December 1985, and the Gerontological Society of America, Chicago, IL, November. 1986.

Activity, though related to mobility, reflects the ability of an individual to remove, by standing or walking, all pressure from skin areas not adapted to weight bearing. Activity also enhances circulation and influences metabolism. Sensory perception reflects the ability to perceive pain or discomfort and to respond purposefully by changing position or seeking assistance in changing position.

Tissue tolerance for pressure is influenced by both extrinsic and intrinsic factors. Extrinsic factors influence tolerance by impinging on the outer layers of the surface of the skin. Skin moisture, friction, and shear are the primary extrinsic factors. Exposure of the skin to moisture leads to maceration and rashes, thus weakening the natural barrier of the epidermis. Friction likewise weakens this barrier as a result of movement over a rough surface. Shearing results when outer layers of the skin slide with rough or sticky surfaces, pulling and potentially tearing underlying tissues.

Intrinsic factors (such as nutritional status, age, and low arteriolar pressure) influence the architecture and integrity of the skin and supporting structures, particularly collagen and elastin, and diminish the ability of soft tissues to absorb and tolerate mechanical load. Other hypothetical relationships described in this schema have not yet been fully studied. Factors that influence the intensity and duration of pressure and variables related to tissue tolerance for pressure interact in a manner not yet fully understood and predispose the tissue to breakdown.

Description of the Braden Scale

The Braden Scale for Predicting Pressure Sore Risk is composed of six subscales—sensory perception, activity, mobility, moisture, friction, and nutrition—which rate selected factors identified in the conceptual schema. Each subscale includes a title, and each subscale and each level has a key concept descriptor and a one- or two-phrase/sentence description of qualifying attributes. Five of the six subscales are rated from 1 (least favorable) to 4 (most favorable); the friction and shear subscale is rated from 1 to 3. A total of 23 points is possible. The subscales are designed so that each level is mutually exclusive with only one choice appropriate for a given subject.

The *sensory perception* subscale measures the ability to feel and subsequently relieve discomfort (Figure 2). The sensation of pressure or discomfort cues a person to make, or seek assistance in making, small or large shifts in body weight. The inability to feel or recognize pressure or discomfort increases risk for pressure sore development. Previous authors (Gosnell, 1973; Norton et al., 1962) had a somewhat parallel but different conceptualization, that of mental status. Mental status, however, does not fully address the issue of sensation or the ability to respond meaningfully to a sensation. For example, confused individuals may have the ability to move when in pain, and alert individuals with paralysis may not be able to sense pressure or move in response to the sensation.

The *moisture* subscale measures the degree to which skin is exposed to moisture. Incontinence of urine and bowels, drainage from wounds, perspiration, and food spillage are potential sources of moisture. Previous scales have combined frequency and type of incontinence but ignored moisture from other sources.

The *activity* and *mobility* subscales are derived from separate but related concepts. Similar subscales were used by both Gosnell (1973) and Norton et al. (1962), but are used in the Braden scale to reflect frequency and duration of activity or position change. Mobility, the ability to relieve pressure through movement, can occur in bedfast patients and is a separate concept from activity.

Nutrition reflects the usual food intake of the patient and offers a range from very poor to excellent. This range was used in an effort to overcome reliability and validity problems associated with the traditional good, fair, poor ratings used in many clinical agencies and in Gosnell's (1973) scale (Bergstrom, Braden, Krall, & Brandt, 1986). This subscale also accounts for liquid supplements, IVs, and parenteral nutrition, and further recognizes that orders for alternative nutrition do not assure adequate intake.

Friction and shear are conceptualized in terms of the individual's ability to assist with movement or to be moved in such a way that the skin is free of contact with the surface of the linen or bedding during movement.

Reliability Studies

Three studies were conducted to determine interrater reliability of the Braden Scale for Predicting Pressure Sore Risk.

Figure 2. The Sensory Perception Subscale of the Braden Scale

BRADEN SCALE
RISK PREDICTORS FOR SKIN BREAKDOWN

PATIENT'S NAME _____ EVALUATOR'S NAME _____ DATE OF ASSESSMENT

SENSORY PERCEPTION Ability to respond to discomfort	*1. Completely limited:* Unresponsive to painful stimuli, either because of state of unconsciousness or severe sensory impairment, which limits ability to feel pain over most of body surface.	*2. Very limited:* Responds only to painful stimuli (but not verbal commands) by opening eyes or flexing extremities. Cannot communicate discomfort verbally. OR Has a sensory impairment which limits the ability to feel pain or discomfort over ½ of body surface.	*3. Slightly limited:* Responds to verbal commands by opening eyes and obeying some commands, but cannot always communicate discomfort or need to be turned. OR Has some sensory impairment which limits ability to feel pain or discomfort in 1 or 2 extremities.	*4. No impairment:* Responds to verbal commands by obeying. Can communicate needs accurately. Has no sensored deficit which would limit ability to feel pain or discomfort.				

Reliability Study I (R-I): The purpose of R-I was to determine the scale's interrater reliability when administered by a graduate student (GS) and a registered nurse (RN) primary caregiver over a period of several weeks.

METHOD. Subjects admitted to a rehabilitation unit of a skilled nursing facility during a 3-month period (August–October 1984) were included in the study if they: (a) had an expected length of stay of 21 or more days, (b) were free of pressure sores or reddened areas, (c) had an initial Braden scale score of 15 or less (two-thirds of the possible score), and (d) consented to participate.

Each subject was observed within 3 days of admission (baseline) and weekly for 1 month, then biweekly for 2 months or until discharge or skin breakdown. At each observation the same GS assessed the patient, using the Braden scale. Ratings were based on direct observation of the patient and consultation with the patient record. At each observation point the RN independently rated the patient using the scale.

RESULTS. Twenty subjects ranging in age from 55 to 96 ($M = 75$, SD = 20) years were included in the study; 14 subjects were female. The majority of subjects had cerebrovascular disease and orthopedic injuries/surgery as primary admitting diagnoses.

Subjects were rated by both the RN and the GS for a period of 1 to 7 weeks. Scores on admission ranged from 11 to 15; on discharge, from 11 to 22. There were a total of 86 pairs of RN and GS observations. Pearson product moment correlation between observers was $r = .99$, $p < .001$. The percent agreement, a more conservative measure of reliability than a correlation (Goodwin & Prescott, 1981), was 88%. In no case was the total score assigned by the two raters more than 1 point different.

Reliability Study II (R-II): The purpose of R-II was to determine the reliability of the Braden scale when used to assess institutionalized elderly by licensed practical nurses (LPN) and nursing assistants (NA), those who commonly provide direct care to the institutionalized elderly, and to determine if the instrument would reflect variability among patients. Staff were not specifically trained in use of the tool because turnover among nursing home staff generally precludes such systematic training.

METHOD. Six bed numbers and two alternates were selected by random draw from each of nine units. The patient occupying the bed on the day of the study became the subject. All data were collected on the same day on each unit during December 1985.

Data collection proceeded as follows: (a) The LPN and NA caring for the subject on the day and the evening shifts were identified; (b) staff were instructed to read the scale and ask questions, but *no* special instruction was provided; (c) the LPN and NA rated the patient without consultation with the investigators or other staff members. The investigators were present on the unit during the rating to insure ratings were done independently.

RESULTS. Fifty-four subjects ranged in age from 37 to 100 ($M = 79$, SD = 12.2) years. The primary admitting diagnoses of subjects included cardiovascular ($n = 21$) and neurological ($n = 11$) disorders. Nine subjects were male; 44, female. (One subject was deleted from analysis due to ambiguous labeling of data.)

The mean score assigned to subjects by the LPN on both shifts ranged from 8.5 to 22.5. The mean score assigned by the NA on both shifts ranged from 7.0 to 23.0.

The total Braden scale scores assigned by LPN and NA were correlated using Pearson product moment correlation. The correlations ranged from a low of $r = .83$, $p < .001$, for both the LPN and the NA on the day shift to a high of $r = .87$, $p < .001$, for the NA on the day and evening shifts. The percent agreement between observations ranged from a low of 11% for the NA on the day and evening shifts to 19% for the LPN on the day and evening shifts.

Reliability Study III (R-III): The purpose of R-III was to determine the reliability of the scale in a skilled nursing facility in a different geographical region than the previous studies.

METHOD. Four raters (LPN and NA from the day shift and LPN and NA from the evening shift) were selected with the assistance of the RN supervisor. Criteria for selection of raters were: (a) The rater's primary assignment for the past month had been to one of the care units under consideration for 20 or more hours per week. (b) The rater was functionally literate in English and willing to participate.

A total of 50 residents whose condition was stable for 2 months were selected for rating. This condition was established to reduce bias which could be introduced by day-to-day variability of patient conditions. Four raters on each care unit independently rated the resident.

DATA ANALYSIS. The estimate of interrater reliability between staff on each unit was based on pairwise correlations among total scores. Correlations between pairs of raters were computed using Pearson product moment correlation. Correlations between 28 pairs of complete scores were: (a) LPN on day and evening shifts, $r = .93$, $p < .001$, and (b) LPN and NA on day shift, $r = .94$, $p < .001$. Correlations between 47 pairs of scores were: (a) NA on day and evening shifts, $r = .84$, $p < .001$, and (b) LPN and NA on the evening shift, $r = .86$, p .001. The percent agreement ranged from a low of 12% (LPN, day and evening) to 38% (LPN and NA, day) and 46% (LPN and NA, evening.)

Validity Studies

The predictive validity of the Braden scale, a form of criterion-related validity (Norbeck, 1985; Shelley, 1984), was studied in two settings. Two indicators of predictive validity, sensitivity and specificity, were measured in these studies (Lilienfeld & Lilienfeld, 1980). Because the methods, analysis, and results of these two studies were similar, they are presented together.

Studies V-I and V-II: PURPOSE AND DEFINITIONS. The purpose of studies V-I and V-II was to determine the sensitivity and specificity of the scale on patients on two medical–surgical units. Sensitivity was defined as the percentage of the subjects who developed pressure sores among those who were predicted to develop pressure sores (Lilienfeld & Lilienfeld, 1980). Specificity, on the other hand, was the percentage of those who did not develop pressure sores and were predicted to be not at risk (Lilienfeld & Lilienfeld).

METHOD. Studies V-I and V-II were conducted in the same large midwestern teaching hospital. Two 28-bed medical–surgical units were chosen because the patients

admitted (a) were known to have longer hospital stays than on most other units, (b) had a variety of diagnoses and were representative of general medical–surgical units, and (c) had conditions and treatments known to the primary and associate nurses. Study V-II was conducted on a unit with higher acuity levels and longer expected lengths of stay than the V-I study unit.

DESIGN. The same prospective design was used for both studies. Subject selection took place over a period of weeks (V-I = 6 weeks, V-II = 12 weeks). All patients admitted to the units were included in the study. The only criterion for subject selection was that the patient was free of skin breakdown on admission to the study.

The definition of the outcome (pressure sores) was made particularly clear to avoid interobserver bias (Wasson, Sox, Neff, & Goldman, 1985). Pressure sores were identified and classified using the following criteria: Stage I, erythema only—redness does not disappear for 24 hours after pressure is relieved; Stage II, break in skin such as blisters, abrasions; Stage III, break in skin exposing subcutaneous tissue; Stage IV, break in skin extending through tissue and subcutaneous layers, exposing muscle and bone.

PROCEDURE. Staff on both units were oriented to the purpose and procedures of the study, use of the scale, and definition of pressure sore stages. A critical cut-off point was not suggested to avoid potential bias of expectation regarding breakdown/no breakdown. Because the instrument was new, no level could be identified at which patients could be deemed at risk. Staff were instructed to give standard care to all patients. Calling attention to pressure sore risk may have resulted in more preventive strategies. The investigators documented all recorded therapies.

The primary and associate nurses routinely recorded most of the required data, enabling the investigator to retrieve data solely from the chart and the nurse. This study, focusing on refinements in nursing assessment, did not alter patient care and was approved by the internal review board under exempt status without necessitating patient consent. This was believed important to the integrity of the design as the entire population was studied and self-selection bias was reduced.

The following procedures were pursued: (a) The investigator admitted subjects to the study within 72 hours of admission to the unit. (b) The primary nurse assessed the patient's skin to determine that no pressure areas were present. (c) The investigator recorded demographic data. (d) The primary or associate nurse rated the patient, using the scale. (e) Skin condition was recorded, including the stage of pressure sore when appropriate. (f) Steps (d) and (e) were repeated weekly and at the time of discharge, transfer, or death.

DATA ANALYSIS. Demographic data were summarized, calculating mean, range, and standard deviations.. The sensitivity and specificity of the scale were calculated for each possible score (6 to 23), using the formulas in Table 1 (Lilienfeld & Lilienfeld, 1980).

RESULTS. One hundred consecutive subjects were studied on each unit. One subject was lost in V-I. Subjects in V-I ranged in age from 18 to 92 years (M = 57.2, SD = 16.8); V-II subjects' ages ranged from 14 to 102 (M = 50.5, SD = 24). The majority of the subjects in both studies were white. (Total scores on the scale ranged from 9 to 23 in V-I, from 8 to 23 in V-II.)

Table 1. Indexes to Evaluate the Accuracy of the Braden Scale for Predicting Pressure Sore Risk: Sensitivity and Specificity[a]

TEST OR EXAMINATION	DISEASE PRESENT	DISEASE ABSENT
Positive (Indicating pressure sores likely to develop)	A (pressure sores)	B (no pressure sores)
Negative (Indicating probably will not have pressure sores)	C (pressure sores)	D (no pressure sores)
Totals	A + C	B + D

Sensitivity is defined as the percentage of those who develop pressure sores, and were so predicted by the scale. Thus,

$$\text{Sensitivity (in \%)} = \frac{A}{A + C} \times 100$$

Specificity is defined as the percentage of those who do not develop pressure sores, and were so predicted by the scale. Thus,

$$\text{Specificity (in \%)} = \frac{D}{B + D} \times 100$$

[a]From Lilienfeld and Lilienfeld, 1980, p. 151.

Table 2. Characteristics of Subjects in Studies V-I and V-II Who Were Pressure Sore Positive (PS+) and Pressure Sore Negative (PS−)

	STUDY			
	V-I		V-II	
CHARACTERISTICS	PS+	PS−	PS+	PS−
Age (years)				
M (± SD)	69.9(± 16)	56.3(± 17)*	91.0(± 26)	48.0(± 23)*
Range	43-92	18-88	25-93	14-102
Admission Braden scale				
M (±SD)	14.0(± 2.5)	20.8(± 2.6)**	13.0(±2.5)	17.8(± 4)**
Range	9-16	10-23	9-16	8-23
Sex				
Male	4	46	7	44
Female	3	46	2	47
Race				
White	5	68	6	71
Other	2	24	3	20

*Wilcoxin rank-sum test, $p < .05$; **Wilcoxin rank-sum test, $p < .001$.

Seven of 99 subjects (7%) in V-I and 9 of 100 (9%) in V-II developed pressure sores. All pressure sores in V-I were stage I; in V-II, five of the pressure sores were Stage I and three progressed to other stages.

Differences between subjects who were pressure sore positive (PS+) and pressure sore negative (PS−) are detailed in Table 2. The mean age of PS+ subjects was significantly greater than PS− subjects in both studies. The total score was significantly lower in PS+ subjects in both studies. There was no statistically significant difference based on race or sex.

The percent sensitivity and specificity for each possible score of the scale is given in Table 3. In Study V-I, using a total of 16 points or less as the critical cut-off point for predicting risk, the scale was 100% sensitive and 90% specific. The 16-point total score was also 100% sensitive in Study V-II, but the specificity was reduced to 64%.

Discussion

The scale for predicting pressure sore risk has proved to be a highly reliable instrument when used by RNs, primary nurses, and graduate students (Study R-I). The nearly perfect agreement between raters was encouraging, but may have been inflated by the investigator's and staff nurses' sharing the same data base for rating some scales

Table 3. Sensitivity and Specificity in Percentage of the Braden Scale for Predicting Pressure Sores for Each Possible Score in Studies V-I and V-II

Braden Score	Study			
	V-I (N = 99)		V-II (N = 100)	
	Sensitivity (%)	Specificity (%)	Sensitivity (%)	Specificity (%)
8			10	96
9	14	100	10	92
10	14	99		
11			20	89
12			40	87
13	29	99	50	83
14	43	99	70	78
15	71	95	80	74
16	100	90	100	64
17	100	88	100	60
18	100	83	100	51
19	100	74	100	43
20	100	65	100	32
21	100	50	100	26
22	100	36	100	10
23	100	0	100	0

(e.g., patient charts for moisture). The interrater reliability between LPN and NA was satisfactory, but not as highly correlated as the study with more highly educated care givers. The percent agreement between LPN and NA on day and evening shifts was disappointing. Many ratings were close, but few were identical.

The investigators believe there may be several reasons for the lower interrater reliability among LPN and NA staff (Studies R-II and R-III). First, day and evening staff have somewhat different sources of knowledge regarding patients, as patients eat two meals on the day shift and one on the evening shift, and activity expectations are greater during the day when physical therapy and other activities are most often scheduled (Studies R-II and R-III). Second, the randomly selected subjects in Study R-II may not have been well known to either the NA or the LPN if the time of residence was short or if patient conditions were changing. The somewhat higher correlations in Study R-III may support this conclusion, as subjects were selected if their condition was stable and they had resided in the institution for 30 days. Last, the level of reading and assessment difficulty may exceed the proficiency of NA and some LPN raters. In fact, percent agreement was somewhat better for LPN than NA raters in Study R-II, but not in Study R-III. Some NA raters had difficulty with the concept of sensory perception in particular, and others, though literate, read with difficulty. None of these raters was trained in the use of the scale, and such training might overcome the reading and assessment difficulties inherent in the tool. The investigators must conclude that the instrument should most appropriately be used by RN care givers.

The predictive validity tested in Studies V-I and V-II demonstrated that the instrument was highly sensitive, predicting 100% of the subjects who developed pressure sores. The specificity of the scale was very good in Study V-I, but overpredicted in Study V-II. This overprediction is somewhat similar to the difficulty reported with the Norton et al. (1962) scale. Using data collected in the most recently reported clinical trial, the Norton scale shows a sensitivity of 88% and specificity of only 36% (Goldstone & Goldstone, 1982). Goldstone and Goldstone studied patients over 60 years of age who were hospitalized on an orthopedic ward, in contrast to the subjects in this study who ranged in age from very young to very old. In previous studies, age had been demonstrated to have a near linear relationship with skin breakdown (Andersen & Kvorning, 1982; Manley, 1978). Hence, even in Study V-II, the Braden scale demonstrated greater specificity than the Norton scale and did so despite the greater variance in age among the subjects.

Although the focus of these studies was on the instrument rather than on nursing care, subjects whose skin eventually broke down received a greater number of nursing therapies than those who did not. This confirms that subjects did not develop pressure sores as a result of neglect.

Some limitations must be acknowledged in the validity studies. Wasson et al. (1985) stressed the importance of clearly defined outcome events (pressure sores) when conducting clinical prediction studies. Although the primary nurses were given criteria for reporting pressure sores (Stages I to IV), staff may have used varying levels of sophistication in making these ratings. The investigators believed that all subjects identified as having pressure sores were correctly assessed, but the possibility remains that pressure sores were not identified in some patients. This factor could increase the likelihood that specificity was in truth higher than was demonstrated. Conversely, if the missed pressure sore occurred in someone with a score higher than 16 it could also decrease sensitivity.

An additional source of bias in these studies could be that the same primary nurse who collaborated with the nurse researcher in rating the subject on admission to the study also reported outcome (pressure sores). This is an obvious limitation of the studies. The fact that the raters were not made aware of the critical cut-off point reduced this source of bias.

A major strength of Studies R-II, R-III, V-I, and V-II was that subjects exhibited a wide range of scores from very high (no risk) to very low (greater risk). This degree of variability increased the likelihood that subjects were representative of the settings in which the studies were done and the instruments were reliable over a wide range of scores.

The construct validity of the scale and the conceptual schema are continuing to be evaluated. Differences between subjects who develop and who do not develop pressure sores in an ongoing prospective study and correlations between variables measured will provide important additional data.

Clinical Implications: The investigators believe the Braden scale is a promising tool for predicting pressure sore risk clinically. It has undergone more formal evaluation than previously reported instruments (Goldstone & Goldstone, 1982; Goldstone & Roberts, 1980; Gosnell, 1973; Norton et al. (1962). The investigators are exercising a great deal of caution when permitting a clinical setting to use the instrument. Protocols are established for determining interrater reliability. It is recommended that each setting conduct a study of the sensitivity and specificity of the instrument to establish appropriate cut-off points. Cut-off points for predicting risk and instituting preventive protocols can be based on a balance between the cost of preventing versus treating pressure sores. These deci-

sions, of course, must be tempered by ethical principles.

Implications for Further Study: The reliability and predictive validity of the Braden scale will be further established in studies done in collaboration with clinical specialists in a variety of settings. Protocols for these studies have been devised with special attention to the recommendations of Sox (1986) and Wasson et al. (1985). Specifically, potential bias will be reduced by having clinicians assess skin independent of persons assessing risk. The definition of skin breakdown will be more clearly developed, and staff will receive training in this assessment. NR

References

ANDERSEN, K. E., & KVORNING, S. A. (1982). Medical aspects of the decubitus ulcer. *International Journal of Dermatology, 21*, 265–270.

BERGSTROM, N., BRADEN, B., KRALL, K., & BRANDT, G. (1986). Adequacy of descriptive scales for reporting diet intake in institutionalized elderly. *Journal of Nutrition for the Elderly, 6*(1), 3–16.

BRADEN, B. J., & BERGSTROM, N. (1987). A conceptual schema for the study of the etiology of pressure sores. *Rehabilitation Nursing, 12*(1), 8–12, 16.

GOLDSTONE, L. A., & GOLDSTONE, J. (1982). The Norton score: An early warning of pressure sores? *Journal of Advanced Nursing, 1*, 419–426.

GOLDSTONE, L. A., & ROBERTS, B. V. (1980). A preliminary discriminant function analysis of elderly orthopaedic patients who will or will not contract a pressure sore. *International Journal of Nursing Studies, 17*, 17–23.

GOODWIN, L. D., & PRESCOTT, P. A. (1981). Issues and approaches to estimating interrater reliability in nursing research. *Research in Nursing and Health, 4*, 323–337.

GOSNELL, D. J. (1973). An assessment tool to identify pressure sores. *Nursing Research, 22*, 55–59.

LILIENFELD, A. M., & LILIENFELD, D. E. (1980). *Foundations of epidemiology* (2nd ed.). New York: Oxford University Press.

MANLEY, M. T. (1978). Incidence, contributory factors, and costs of pressure sores. *SA Medical Journal, 53*, 217–222.

NORBECK, J. S. (1985). What constitutes a publishable report of instrument development? *Nursing Research, 34*, 380–382.

NORTON, D., MCLAREN, R., & EXTON-SMITH, A. N. (1962). *An investigation of geriatric nursing problems in hospitals*. London: National Corporation for the Care of Old People.

ROBERTS, B. V., & GOLDSTONE, L. A. (1979). A survey of pressure sores in the over sixties on two orthopaedic wards. *International Journal of Nursing Studies, 16*, 355–364.

SHELLEY, S. I. (1984). *Research methods in nursing and health*. Boston: Little, Brown & Company.

SOX, H. C. (1986). Probability theory in the use of diagnostic tests. *Annals of Internal Medicine, 104*, 60–66.

WASSON, J. H., SOX, H. C., NEFF, R. K., & GOLDMAN, L. (1985). Clinical prediction rules: Applications and methodological standards. *New England Journal of Medicine, 313*, 793–799.

CALLS FOR PAPERS

Papers are needed for a research symposium, "Nursing: Human Touch in High Tech," sponsored by the West Virginia Nurses' Association, to be held in Lewisburg, WV, November 1–4, 1987. Abstract submission deadline is **July 30, 1987.** For information contact: Janet F. Wang, PhD, RN, Chair, Organizing Committee, School of Nursing, West Virginia University, Morgantown, WV 26506; 304/293-4297.

Abstracts are invited for the 4th Biennial Conference on Nurse Managed Centers, sponsored by the School of Nursing, University of Wisconsin—Milwaukee and the Milwaukee Consortium of Nurse Managed Centers, to be held in Milwaukee, May 25–27, 1988. Deadline for submission is **September 15, 1987.** For information contact: Susan Riesch, DNSc, RN, Associate Professor, School of Nursing, University of Wisconsin-Milwaukee, PO Box 413, Milwaukee, WI 53201; 414/963-4801.

Papers are needed for the 2nd Annual Research Conference, sponsored by Beta Delta Chapter of Sigma Theta Tau, "Clinicians, Administrators, Researchers, and Educators: Partners in Practice," to be held in Oklahoma City, OK, April 21–22, 1988. Abstract deadline is **September 15, 1987.** For information contact: Sharol Jacobson, PhD, RN, College of Nursing, University of Oklahoma, PO Box 26901, Oklahoma City, OK 73190; 405/271-2306.

Abstracts are needed for the 13th World Conference on Health Education to be held August 28–September 2, 1988, in Houston, TX. Abstracts should address the conference theme, "Participation for All in Health" or its four subthemes: "Involving People and Community," "Supporting Community Access;" "Involving the Total Health System," and "Gaining Intersectoral Support." Deadline for USA abstract submission is **September 30, 1987;** for international abstract submission, **October 30, 1987.** For information contact: United States Host Committee, PO Box 20186, W-902, RAS Building, Houston, TX 77225; 713/792-8540.

Abstracts needed for the 2nd National Nursing Symposium on Modeling and Role Modeling: A Theory and Paradigm for Professionals, to be held at Hilton Head Island, SC, May 15–21, 1988. Deadline for submission is **September 30, 1987.** For information contact: Helen Erickson, PhD, RN, College of Nursing, University of South Carolina, Columbia, SC 29208; 803/777-7576.

Abstracts are needed for a conference "Control of Practice Through Nursing Research," sponsored by the Sigma Theta Tau Beta Upsilon Chapter and Arizona State University College of Nursing, to be held in Tempe, AZ, February 12, 1988. Abstracts must be postmarked by **October 1, 1987.** For information contact: Doris Milton, PhD, RN, Chair, Research Committee, Beta Upsilon Chapter, Sigma Theta Tau, College of Nursing, Arizona State University, Tempe, AZ 85287; 602/835-3301.

Abstracts of completed research addressing "Nursing Research—A Proud Tradition" are needed by Eta Chapter of Sigma Theta Tau for its annual Research Day, to be held March 18, 1988, in Pittsburgh, PA. Submission must be no later than **October 1, 1987.** For information contact: Judith A. Erlen, PhD, RN, Assistant Professor, School of Nursing, University of Pittsburgh, 467 Victoria Bldg., Pittsburgh, PA 15261; 412/624-1905.

Summaries of research on aspects of patient comfort are needed for a national conference and monograph funded by the National Center for Nursing Research, to be held in Chapel Hill, NC, March 24-26, 1988. The conference is co-sponsored by the University of North Carolina at Chapel Hill School of Nursing, ANA Council of Nurse Researchers, SCCEN, and Sigma Theta Tau Alpha Alpha Chapter. Submission deadline is **October 1, 1987.** For information contact: Ruth Wiese, MSN, RN, Project Manager, School of Nursing, University of North Carolina, Carrington Hall 214H, Chapel Hill, NC 27514; 919/966-2263.

Abstracts are invited for the 11th Annual Geriatric Research and Clinical Practice Conference, sponsored by the University of Florida Colleges of Nursing and Medicine, to be held in Orlando, FL, February 16–17, 1988. Deadline for submission is **October 1, 1987.** For more information contact: Melody J. Marshall, PhD, RN, College of Nursing, University of Florida, Gainesville, FL 32610; 904/392-3531.

Papers are invited for presentation at the biennial History of Nursing Conference to be held May 6, 1988, in Boston, MA. Deadline for abstracts is **October 15, 1987.** For information contact: Nursing Archives/Department of Special Collections, Mugar Memorial Library, Boston University, 771 Commonwealth Ave., Boston, MA 02215.

Abstracts are invited for "Nursing Research–Emerging Practice," the 1st Regional Research Day, sponsored by Sigma Theta Tau chapters of Yale University, the University of Connecticut, and the University of Rhode Island, to be held March 18, 1988. Deadline for submission is **October 15, 1987.** For information contact: Linda Brown, PhD, RN, Yale School of Nursing, 855 Howard Ave., PO Box 3333, New Haven, CT 06510-8044.